DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention]This invention relates to the hybrid drive type mobile which uses a battery and a fuel cell as a power supply of motors for a mobile drive, such as vehicles and a marine vessel.
[0002]
[Description of the Prior Art]An electric motor is used as an object for a vehicles drive for low-pollution-izing of vehicles, While lengthening 1 charge mileage as the power supply, in order to perform the electric power supply efficiently stable at the time of high power, such as the time of a constant-speed run, and acceleration, the electromobile of the hybrid system which combined the object for constant speeds and the cell for high power is developed. Methanol is used as primary fuel in such a hybrid driving vehicle, A fuel cell including the water gas shift reaction machine for processing a reformer (reformer) and carbon monoxide, etc. is made into a power supply source, and the hybrid driving vehicle used combining rechargeable batteries (battery), such as a lead storage battery which takes charge of peak load etc. in addition to this power supply source, is considered.
[0003]
[Problem(s) to be Solved by the Invention]In such a hybrid driving vehicle, Use two power supplies, a fuel cell and a battery, properly, and electric power is supplied efficiently, It is desirable when operating detecting power supply states, such as fuel under run and a residue of capacity, and always grasping the distance which can be run enables prompt management to the operation control and power supply degradation which were stabilized to the destination, a fuel scarcity, etc.
[0004]This invention is a thing in consideration of the above-mentioned point, and is ****. the purpose is offer of the hybrid drive type mobile which can be operated while always grasping a power supply state as it being alike, the state of two power supplies being detected, movable distance being computed based on the detected information, and it being able to run convenient to the destination.

[0005]
[Means for Solving the Problem]In a hybrid drive type mobile which has the 1st and 2nd power supply sources as a power supply of the source of power for a mobile drive in this invention in order to attain said purpose, Electric power supply possible quantity by each of said 1st and 2nd power supply sources is detected, and a hybrid drive type mobile having a program which computes movable distance of this mobile from such electric power supply possible quantity is provided.

[0006]Since according to this composition each electric power supply possible quantity of the 1st and 2nd power supplies that constitute a hybrid, for example, capacity, and a residue of fuel are detected and movable distance of a mobile is computed during moving operation based on this, In a case where operation stabilized to a destination is checked and movable distance is insufficient, a shortage of a residue, etc., it can be coped with promptly.
[0007]In a desirable example of composition, said 1st power supply is a fuel cell, and the 2nd power supply is a battery, While computing specific fuel consumption of this fuel cell and a battery, or a rate of capacity consumption of a mobile and computing movable distance of said mobile based on these consumption rates, When a residue of a residue of fuel of said fuel cell and capacity of said battery is below a predetermined preset value, it is characterized by performing an alarm display.
[0008]According to this composition, a fuel cell and a battery (rechargeable battery) constitute a hybrid power supply, specific fuel consumption of a fuel cell is computed from quantity of distance which moved, and used fuel, and movable distance by a fuel cell is computed from this specific fuel consumption and a residue of fuel. A battery or a rate of capacity consumption of a mobile is computed from the amount of sag of distance and a battery which moved, or the amount of capacity consumption as the whole mobile, and movable distance is computed from this rate of capacity consumption, and a capacity residue. In this case, if a residue of fuel and a residue of battery capacity are below a predetermined value, an alarm display will be carried out and management of a fuel supplement, battery exchange or charge, etc., etc. can be performed.
[0009]In a still more desirable example of composition, it has beforehand capacitance-characteristics data corresponding to current and voltage of said battery, and is characterized by computing battery capacity based on said capacitance-characteristics data from current of this battery, or detected information of voltage.
[0010]According to this composition, capacitance-characteristics data corresponding to current and voltage of a battery is beforehand stored in ROM etc., and battery capacity (residue) in that detection time is computed from stored capacitance-characteristics data by detecting current or voltage of a battery based on that detected information.
[0011]In a still more desirable example of composition, after acquiring the 1st detected information of said current or voltage, the 2nd detected information of current or voltage is acquired after specified time elapse, and it is characterized by computing impedance from a capacity computed value based on these 1st and 2nd detected information.
[0012]According to this composition, after computing and carrying out specified time elapse of capacity and impedance of a battery based on the 1st detected information, capacity and impedance are computed based on the 2nd detected information, and a degradation state of a battery is identified by change of this impedance. In consideration of change of this impedance, movable distance is computable based on battery residual quantity.
[0013]
[Embodiment of the Invention]With reference to drawings, an embodiment of the invention is described below. Drawing 1 is an entire configuration figure of the hybrid driving vehicle concerning an embodiment of the invention. The hybrid driving vehicle 1 of this embodiment is applied to the motor bicycle. The hybrid driving vehicle 1 is equipped with the hybrid drive 2. The hybrid drive 2 has the electric motor unit 3, the gearbox 4, the vehicle controller 5, the battery unit 6, and the fuel cell unit 7.
[0014]The fuel cell unit 7 is arranged behind the sheet 8 in the upper position of the driving wheel 9.

Ahead [of the sheet 8] between the front forks 12 which steer the steering control wheel 11, the methanol tank 13 is arranged. The fuel-injection cap 14 is formed in the methanol tank 13.
[0015]The electric motor of the electric motor unit 3 is driven by the hybrid type by the fuel cell of the fuel cell unit 7, and the battery of the battery unit 6, and the driving wheel 9 is rotated.
[0016]Drawing 2 (A) is a figure of another example of shape of the motor bicycle of a hybrid drive type, and the figure (B) is a lineblock diagram of the hydrogen supply system for the fuel cells. This hybrid driving vehicle 1 has the vehicle controller 5 and the battery unit 6 in the lower part of the sheet 8, the electric motor unit 3 is formed in the lower part of the vehicle controller 5, and the fuel cell unit 7 is formed **** and ahead [its]. The hydrogen supply system 15 for supplying hydrogen for electric power generating on the loading platform behind the sheet 8 at the fuel cell unit 7 is ****.
[0017]As shown in drawing 2 (B), the hydrogen supply system 15 was provided with the hydrogen cylinder 16 with the methanol tank 13, had the fan 17 and the burner 18 which supply combustion air, and is provided with the reformer 19 which makes primary fuel heat and evaporate and obtains hydrogen through a catalyst like the after-mentioned.
[0018]Drawing 3 is an outline lineblock diagram of the hybrid driving vehicle concerning this invention. In this hybrid driving vehicle 1.It has the ramp units 25, such as main-switch SW1, the sheet 8, the stand 20, the foot rest 21, the accelerator grip 22, the brake 23, the display 24, a lamplight machine, and a blinker, the user input device 26, the nonvolatile memory 27, and the timer 28, Furthermore, it has the electric motor unit 3, the gearbox 4, the vehicle controller 5, the battery unit 6, and the fuel cell unit 7.
[0019]An ON/OFF signal is sent to the vehicle controller 5 from main-switch SW1, and an electric motor drives. The sensor S1 - S4 are provided, respectively, an ON/OFF signal is sent to the vehicle controller 5 from these sensors S1 - S4, and each operating state is detected by the sheet 8, the stand 20, the foot rest 21, and the brake 23.
[0020]The accelerator grip 22 constitutes an output setting means, the accelerator opening sensors S5 are formed in this accelerator grip 22, and an accelerator opening signal is sent to the vehicle controller 5 from the accelerator opening sensors S5 by a user's grip operation. Control of an electric motor is performed according to an accelerator opening. The vehicle controller 5 constitutes the control means which controls the output of an electric motor based on the output set value of the output setting means constituted by the accelerator grip 22.
[0021]The user can input various data into the vehicle controller 5 from the user input device 26, for example, the operating characteristic of vehicles can be changed. The vehicle controller 5 reads and controls the operational status information which data transfer is performed between the nonvolatile memory 27 and the timer 28, and the vehicle controller 5, memorizes the operational status information at that time to the nonvolatile memory 27 at the time of a vehicle operation stop, and is memorized at the time of a start up.
[0022]The display 24 is driven with a display ON/OFF signal from the vehicle controller 5, and the operational status of an electric motor is displayed on the display 24. The ramp units 25, such as a lamplight machine and a blinker, comprise the lamps 25b, such as the DC/DC converter 25a, a lamplight machine, and a blinker. The DC/DC converter 25a is driven with the starting ON/OFF signal from the vehicle controller 5, and the lamp 25b is turned on.
[0023]The electric motor unit 3 is equipped with the electric motor 31, the encoder 32 and the regenerative current sensor S11 which are connected with Motor Driver 30 and the driving wheel 9, and the regenerative energy control means 33. Motor Driver 30 controls the electric motor 31 by the duty

signal from the vehicle controller 5, and the driving wheel 9 drives with the output of this electric motor 31. The encoder 32 detects the magnetic pole position and number of rotations of the electric motor 31. Motor-rotation-frequency information is stored in the memory in Motor Driver 30 from the encoder 32, and it is sent to the vehicle controller 5 if needed. The output of the electric motor 31 is changed gears with the gearbox 4, the driving wheel 9 is driven, and the gearbox 4 is controlled by the gear change order signal from the vehicle controller 5. A motor voltage sensor or the motor current sensor S7 is formed in the electric motor 31, and the information on this motor voltage or motor current is stored in the memory in Motor Driver, and is sent to the vehicle controller 5 if needed.

[0024]The battery unit 6 is equipped with the battery 60, the battery controller 61, and the battery relay 62. The fuel cell unit 7 is equipped with the fuel cell 70, the fuel cell controller 71, the prevention-of-backflow element 72, and the fuel cell relay 73 which constitute a power generation means. It has the 1st power supply passage L1 that enables supply of the output current of the fuel cell 70 to the battery 60, and the 2nd power supply passage L2 that enables supply of the output current from the battery 60 to the electric motor 31, and electric power is supplied via the power regulating part 80.

[0025]The battery controller 61 is equipped with it by detection means to detect the charging state of the battery 60, and this detection means, It comprises the battery temperature sensor S12, the battery voltage sensor S13, and the battery current sensor S14, and these information is stored in the memory in the battery controller 61, and is inputted into the vehicle controller 5 if needed. The battery relay 62 operates with the ON/OFF signal from the vehicle controller 5, and controls the electric power supply from the 2nd power supply passage L2.

[0026]Commo data is sent to the fuel cell controller 71 from the vehicle controller 5, and, thereby, the fuel cell controller 71 controls the fuel cell 70. The fuel cell controller 71 is equipped with a detection means to detect the state of the fuel cell 70. This detection means comprises the various temperature sensors S21, the fuel cell voltage sensor S22, and the fuel cell current sensor S23, and these information is stored in the memory in this fuel cell controller 71, and is inputted into the vehicle controller 5 if needed. The fuel cell relay 73 connected to the fuel cell controller via the rectifier diode (prevention-of-backflow element) 72 operates with the ON/OFF signal from the vehicle controller 5, and controls an electric power supply from the 1st power supply passage L1.

[0027]Drawing 4 is an important section lineblock diagram of the fuel cell unit concerning an embodiment of the invention. The fuel cell unit 7 of this embodiment comprises the methanol tank 102, the reformer (reformer) 103, the shift converter 104, the selective oxidation reactor 105, the fuel cell (cell) 70, the water-recovery heat exchanger 107, the water tank 108, and the fuel cell controller 71. The fuel cell controller 71 is connected with each apparatus, such as a valve, a pump, and a fan, and a sensor. Each part of the reformer 103, the shift converter 104, the selective oxidation reactor 105, and the fuel cell 70 is equipped with temperature sensor Tr, Tb, Ts, Tp, and Tc, and each part is controlled by these temperature detection by appropriate temperature by the fuel cell controller 71 (drawing 3).

[0028]The reformer (reformer) 103 is equipped with the warmer (burner) 110, the evaporator 111, and the catalyst bed 112. In the warmer 110, the burner pump 113 drives by temperature detection of temperature sensor Tb, and methanol is supplied from the methanol tank 102 to it, and air is supplied by the drive of the burner fan 114 to it, and the evaporator 111 is heated by these combustion works to it. The double circle in a figure shows an air-intake. The methanol supplied from the methanol tank 102 and the water supplied from the water tank 108 by the drive of the water pump 116 are mixed and supplied to the evaporator 111 by the drive of the methanol pump 115. The fuel which heated the

evaporator 111 with the warmer 110, evaporated the composite fuel of methanol and water, and was evaporated with this evaporator 111 is supplied to the catalyst bed 112.
[0029]Further, to the burner 110, surplus (or it bypassed) hydrogen gas from the fuel cell (cell) 70 is supplied through the piping 201, and burns to it. With the combustion heat of this burner 110, while making the primary fuel (raw material) which consists of methanol and water evaporate, the catalyst bed 112 is heated and the catalyst bed 112 is maintained to reaction temperature required for catalytic reaction. The air which did not contribute to combustion gas and a reaction is discharged outside through the flueway 202.
[0030]The catalyst bed 112 consists of a catalyst of for example, a Cu system, and decomposes the gaseous mixture of methanol and water into hydrogen and carbon dioxide as follows at the catalytic-reaction temperature of about 300 **.
[0031]It is generated by a small amount of (about 1%) carbon monoxide in the catalyst bed 112 of CH_3OH+H_2O->3H $_2$+CO_2 **.
[0032]In order that CO of CH_3OH->2H $_2$+CO ** may stick to a catalyst within the cell 70 and may reduce an electromotive force reaction, in the shift converter 104 and the selective oxidation reactor 105 by the side of the latter part, it reduces the concentration, and makes concentration within the cell 70 100 ppm - about 10 ppm of numbers.
[0033]Within the shift converter 104, at about 200 **, reaction temperature makes it change into CO_2 from CO by the following reactions depended on water, i.e., the chemical reaction of CO+H_2O->H_2 +CO_2, and reduces concentration to about 0.1%.
[0034]CO_2 from CO is made to carry out the chemical change of this by oxidation reaction of 2 CO+O_2->2CO_2 at the catalytic-reaction temperature of about 120 ** into the selective oxidation reactor 105 using a platinum system catalyst further, and concentration is further made into the 1/10 or less than it. Thereby, the CO concentration within the cell 70 can be reduced to about several 10 ppm.
[0035]The hydrogen obtained by reforming a raw material and manufacturing hydrogen as mentioned above by said reformer 103 is supplied to the fuel cell 70 via the shift converter 104 and the selective oxidation reactor 105. Between the reformer 103 and the shift converter 104, the buffer tank 117 and the change-over valves 117a and 117b for absorbing pulsation and pressure fluctuation are provided, and hydrogen is returned to the warmer 110 of the reformer 103 by the operation of these change-over valves 117a and 117b. The shift converter 104 is cooled by temperature detection of the temperature sensor Ts with the air fan 118 for cooling. Cooling air is discharged outside through the flueway 203.
[0036]Between the shift converter 104 and the selective oxidation reactor 105, the buffer tank 124 and the change-over valves 124a and 124b are formed, and hydrogen is returned to the warmer 110 of a reformer by the operation of these change-over valves.
[0037]The air supplied by the drive of the air pump 119 for a reaction is mixed in the hydrogen sent from the shift converter 104, and it is supplied at the selective oxidation reactor 105. The selective oxidation reactor 105 is cooled by temperature detection of the temperature sensor Tp with the air fan 120 for cooling. Cooling air is discharged outside through the flueway 204.
[0038]Between the selective oxidation reactor 105 and the fuel cell 70, the buffer tank 121 and the change-over valves 121a and 121b are formed, and hydrogen is returned to the warmer 110 of the

reformer 103 by the operation of these change-over valves.
[0039]By flow control of the change-over valves 121a and 121b to the above-mentioned change-over valves 117a and 117b to the shift converter 104, the change-over valves 124a and 124b to the selective oxidation reactor 105, and the fuel cell 70. The quantity of the hydrogen supplied to the fuel cell 70 is adjusted, and electromotive force can be adjusted. In this case, since oxygen is supplied superfluously, electromotive force is controlled by quantity of hydrogen.
[0040]Based on the sensor S21 of the above-mentioned fuel cell unit 7 - the data of 23, and the detected information of the operational status from other various sensors, adjustment of such electromotive force, The vehicle controller 5 calculates required electromotive force, and the vehicle controller 5 or the fuel cell controller 71 calculates the flow of each change-over valve in consideration of a time lag until the hydrogen quantity in the cell after change-over valve operation actually changes based on this etc., Based on this, the fuel cell controller 71 performs ON/OFF control or opening control of each change-over valve. In this case, although the hydrogen quantity evaporated by increasing the amount of supply of primary fuel, such as methanol, can be increased and electromotive force can be heightened, a time lag occurs in this case by the increase in the hydrogen quantity which contributes to power generation. Such a time lag is covered by the electric power from a battery.
[0041]Water is supplied to the fuel cell 70 from the water tank 108 by the drive of the cooling humidification pump 122, Air is supplied by temperature detection of temperature sensor Tc from the water-recovery heat exchanger 107 by the drive of the application-of-pressure air pump 123, and it generates electricity as follows with the fuel cell 70 from these water, air, and hydrogen.
[0042]The fuel cell 70 provides the porous catalyst layer (not shown) of for example, a platinum system, and forms an electrode in the both-sides side of the cell film (not shown) in which the water passage 205 for cooling and humidification was formed. Hydrogen is supplied to one electrode from the selective oxidation reactor 105 through the hydrogen path 206, and oxygen (air) is supplied to it through the oxygen passage 207 at the electrode of another side. A hydrogen ion moves to an oxygen lateral electrode through a cell film from the hydrogen path 206 of a hydrogen lateral electrode, it combines with oxygen, and water is formed. Electromotive force occurs in inter-electrode by movement of the electron (-) accompanying movement of this hydrogen ion (+).
[0043]This electromotive force generating is an exoergic reaction, and in order to cool this, and in order to move a hydrogen ion to the oxygen electrode side smoothly, water is supplied to the water passage 205 of the cell film between two electrodes with the pump 122 from the water tank 108. Heat exchange of the water which passed through the water passage 205 and became an elevated temperature is carried out to air by the heat exchanger 107, and it returns to the water tank 108. The radiation fin 208 is formed in the water tank 108, and water is cooled. 209 is an overflow pipe.
[0044]Air is introduced into the heat exchanger 107. Heat exchange of this air is carried out to hot water, it turns into high temperature air, and is supplied to the oxygen passage 207 by the air pump 123. By sending in such high temperature air, a ligation reaction with a hydrogen ion is promoted and an electromotive force reaction is performed efficiently. For this reason, as for the air-intake (the double circle in a figure shows) to this heat exchanger 107, it is desirable to provide near [from which the above-mentioned high temperature catalyst reaction is started] the selective oxidation reactor 105 or the catalyst bed 112.
[0045]Oxygen in the air which passed through the oxygen passage 207 and was combined with the hydrogen ion serves as water, and is collected by the water tank 108. The remaining air (oxygen and

nitrogen) is discharged outside through the flueway 210.

[0046]Thus, heat exchange of the water generated by the water and power generation which were used with the fuel cell 70 is carried out between cooling air by the water-recovery heat exchanger 107, and it is returned to the water tank 108. A part for the surplus of hydrogen used for power generation is returned to the warmer 110 of the reformer 103 through the valve 211 and the piping 201 with the fuel cell 70.

[0047]By as mentioned above, the reformer 103 which supplied the raw material which heated the evaporator 111 and was evaporated with this evaporator 111 with the warmer 110 to the catalyst bed 112 in the fuel cell unit 7. It generates electricity by supplying the hydrogen obtained by reforming a raw material and manufacturing hydrogen to the fuel cell 70 via the shift converter 104 and the selective oxidation reactor 105. In this case, the hydrogen obtained from the selective oxidation reactor 105 may once be stored in the hydrogen cylinder 16, as shown in above-mentioned drawing 2 (B).

[0048]As the output of such a fuel cell 70 was shown in above-mentioned drawing 3, it is connected to the power regulating part 80 via the prevention-of-backflow element 72 and the fuel cell relay 73, and this power regulating part 80 is connected to the battery 60 and the electric motor 31.

[0049]Drawing 5 is a block lineblock diagram of a power control system of the hybrid driving vehicle concerning this invention. The vehicle controller 5 is connected to the electric motor unit 3, the battery unit 6, and the fuel cell unit 7 via the two-way communication line 220,221,222, respectively. The fuel cell unit 7 is connected to the electric motor unit 3 via the (+) side current lines 223a and the (-) side current lines 223b. (+) The switch 225 is formed on the side current lines 223a. The ON/OFF drive of this switch 225 is carried out by the vehicle controller 5.

[0050]The battery unit 6 is connected to the electric motor unit 3 via the (+) side current lines 224a and the (-) side current lines 224b. (+) The switch 226 is formed on the side current lines 224a. The ON/OFF drive of this switch 226 is carried out by the vehicle controller 5.

[0051]The electric motor unit 3 unifies a controller (Motor Driver 30) and an encoder, a sensor, etc. as a module with the electric motor 31 (drawing 3). In such an electric motor unit 3, it is really removable to vehicles as a member. Therefore, the two-way communication line 220 and the current lines 223a, 223b, 224a, and 224b are connected to Motor Driver 30 which serves as a controller of the electric motor unit 3 via a coupler (not shown), respectively.

[0052]Motor Driver 30 has a memory, and detected information, such as the operational status of the electric motor unit 3, for example, number of rotations, a throttle opening, a travel speed, required load, temperature, and a shift position, is always rewritten, and it is stored.

[0053]The battery unit 6 unifies the battery controller 61, and sensor S12-14 and relay 62 grade as a module with the battery 60, as shown in above-mentioned drawing 3. In this battery unit 6, it is really removable to vehicles as a member. Therefore, the two-way communication line 221 and the current lines 224a and 224b are connected to the battery controller 61 of this battery unit 6 via a coupler (not shown).

[0054]This battery controller 61 has a memory, detects condition data, such as temperature of this battery unit, voltage, and current, and the residue data of the battery 60, and always stores them with rewriting. While delivering and receiving data by two-way communication between vehicle controllers and supplying required electric power during operation by this, when the battery 60 is exchanged, the residue can be promptly checked by the vehicle controller side, and data processing, such as distance which can be run, can be performed.

[0055]The fuel cell unit 7 unifies the fuel cell controller 71 and the sensor S21 - 23 (drawing 3) and relay 73 grade as a module with the above-mentioned fuel cell 70, reformer, etc. In this fuel cell unit 7, it is really removable to vehicles as a member. Therefore, the two-way communication line 222 and the current lines 223a and 223b are connected to the fuel cell controller 71 of this fuel cell unit 7 via a coupler (not shown).
[0056]The fuel cell controller 71 has a memory and always stores detected information, such as condition data, such as temperature of this fuel cell unit 7, voltage, and current, and capacity data (specifically residue of a methanol tank) of a fuel cell, with rewriting. While delivering and receiving data by two-way communication between vehicle controllers and supplying required electric power during operation by this, data processing, such as distance which can be run, can be performed.
[0057]Although the fuel cell and the battery were used in the embodiment of drawing 5 as two power supply sources which constitute a hybrid driving vehicle, two fuel cells or two batteries (rechargeable battery) may be used, and an engine type dynamo and a capacitor can also be used. It can apply to a marine vessel and other devices besides vehicles, and this invention is **.
[0058]Drawing 6 is an explanatory view of the data communications of the control system of the hybrid driving vehicle concerning this invention. The vehicle controller 5 sends the requirement signal of the various data accumulated in the memory of each controller to each of Motor Driver (controller of an electric motor) 30, the battery controller 61, and the fuel cell controller 71. Required data is replied to this data request to each controllers 30 and 61 and 71 empty-vehicle both the controllers 5. As contents of data, control information, such as state information, such as temperature, voltage, current, error information, and capacity, and required power, etc. are transmitted and received.
[0059]In this case, the vehicle controller 5 calculates the optimal drive quantity to each unit based on the data from each controllers 30, 61, and 71, The data of this drive quantity can be used as train-operation-dispatching data, can be transmitted to each controllers 30, 61, and 71, and drive controlling of the electric motor unit 3, the battery unit 6, and the fuel cell unit 7 can be carried out.
[0060]Drawing 7 is a flow chart of the state detection of the power supply system of the hybrid driving vehicle concerning this invention. The operation of each step is as follows.
[0061]S101: Distinguish whether vehicles are [********] under operation by ON/OFF of a main switch, and perform the flow of the following programs only at the time of ON.
[0062]S102: Send the requirement signal of the data (information capacity) of battery capacity and the amount of methanol corresponding to the capacity of a fuel cell to the battery controller 61 and the fuel cell controller 71 from the vehicle controller 5, respectively. In this case, battery capacity and the quantity of the fuel for a methanol tank are detected for RAM or nonvolatile memory by the battery controller 61 and the fuel cell controller 71 with **** and a given period, respectively, and that detected information is always rewritten and is stored.
[0063]S103: Battery capacity data (residue data) is replied to a vehicle controller from a battery controller.
S104: The data of the residue (electric power supply possible quantity) of methanol is replied to a vehicle controller from a fuel cell controller.
S105: A vehicle controller computes the distance it can run with the battery residual quantity from battery capacity data, and computes the distance it can run with the remaining fuel from the data of the amount of methanol.
S106: Display the distance in the computed battery which can be run, and the distance in a fuel cell

which can be run on a display panel, respectively.
[0064]Drawing 8 is residue detection of each power supply under run, and a flow chart of the display action. As above-mentioned drawing 6 explained, the vehicle controller 5 transmits and receives various data between the battery controller 61 and the fuel cell controller 71.
[0065]S111: Take out the data of the mileage from a start-up point in time. This traveled distance data is written in RAM (or nonvolatile memory) which equipped RAM (or nonvolatile memory) or the vehicle controller of the battery controller or the fuel cell controller with the detected information based on the distance sensors formed in the axle, and reads this.
[0066]S112: Compute specific fuel consumption based on the amount-used data (difference of the present residue of a methanol tank, and the residue at the time of a start up) and traveled distance data of methanol fuel from a start-up point in time. This specific fuel consumption is used for the operation of the distance by a fuel cell which can be run.
[0067]S113: Compute the rate of capacity consumption as a vehicles total based on the capacity data (the present battery capacity) and traveled distance data of a battery. This rate of capacity consumption is used for the operation of the distance by battery residual quantity and a methanol residue which can be run.
[0068]For example, the data of the amount of capacity consumption of the whole vehicles including fuel consumption and the amount of battery consumption may be acquired, the rate of capacity consumption of vehicles may be computed based on this amount of capacity consumption and traveled distance data, and the distance which can be run may be calculated based on this.
[0069]For example, the distance which can be run is set to 3000/(100+5.0) *2.0=70km, when the rate of capacity consumption of the whole vehicles considers it as 2.0 km/Ah by 100 cc/Ah in the consumption rate of an electric power supply machine (fuel cell) and remaining fuel is [battery residual quantity] 5.0Ah in 3000 cc.
[0070]S114: The quantity of the methanol fuel in a tank distinguishes whether it is below a predetermined preset value.
S115: If there is more quantity of methanol fuel than a predetermined preset value, the usual residual quantity display will be performed to a fuel display panel.
S116: When the quantity of methanol fuel is below a predetermined preset value, battery residual quantity distinguishes whether it is below a predetermined preset value. If there is more battery residual quantity than a predetermined preset value, the usual battery residual quantity display will be performed by the above S115 with the above-mentioned methanol fuel.
S117: When methanol fuel or battery residual quantity is below a predetermined preset value, perform each alarm display to a display panel.
[0071]S118: In a certain case, fuel distinguishes whether battery residual quantity is [many] below a predetermined preset value from a preset value by S114. if it is below a preset value -- an alarm display (Step S117) -- if large, the usual residual quantity display (Step S115) will be performed.
[0072]Drawing 9 shows the flow of capacity management of the battery under run. Drawing 10 is a graph of the capacitance characteristics (rate over maximum capacity) corresponding to current (I) and voltage (V) of the battery. As mentioned above, the vehicle controller 5 is transmitting and receiving data by the battery controller 61 and two-way communication.
[0073]S121: Read the voltage of a battery, and/or the 1st detected information of current from a battery controller, and transmit to a vehicle controller. The vehicle controller is beforehand stored in ROM etc.

by using the data of the capacitance characteristics of drawing 10 as a map. With the data of voltage or current, the grade [exhausting / of the capacity of the battery in the time] (is it what% of maximum capacity?) is searched for from the map of a capacitance-characteristics graph. This battery capacity changes, as a figure Nakaya seal shows with hour-of-use progress as an example.
[0074]S122: Start the count of a timer after acquiring the 1st data of current and voltage.
[0075]S123: It is distinguished whether it reached by the timer at the predetermined set period. The count of a timer is continued until it reaches at a set period.
S124: If a set period passes, the current of a battery and/or the 2nd data of voltage will be read from a battery controller, and it will transmit to a vehicle controller.
[0076]S125: Based on the 1st above-mentioned data and this 2nd data, while searching for the grade [exhausting / of battery capacity] from the graph of drawing 10, calculate impedance. The degradation state of a battery is distinguished by change of this impedance.
[0077]as an option -- the time of battery use -- the switches (FET etc.) by the side of a battery -- base -- by switching quickly, the current and voltage in a state of the same current can be detected mostly, and battery residual quantity and impedance can also be computed from the current and the voltage characteristic in this constant current state.
[0078]
[Effect of the Invention]Since each electric power supply possible quantity of the 1st and 2nd power supplies that constitute a hybrid during moving operation, for example, capacity, and the residue of fuel are detected in this invention and the movable distance of a mobile is computed based on this, as explained above, In the case where operation stabilized to the destination is checked and movable distance is insufficient, the shortage of a residue, etc., it can be coped with promptly.

[Translation done.]